



Inside this issue

- 2 Just for street and road workers
- 2 Interacting with the public
- 3 Adjusting the motor grader blade
- 5 Maintaining shoulders on granular surfaced roads
- 6 Providing dust control
- 7 General safety tips for street and road workers
- 8 2005 Better Mousetraps
- 8 Plow mounting procedure change for Wausau down-pressure plow
- 9 Skid loader attachment rack
- 9 Hydraulic hose organizer for batwing mower
- 10 Stanley L. Ring Memorial Library: New acquisitions
- 10 CTRE houses new weather research center
- 11 Conference calendar

Iowa State University's Center for Transportation Research and Education (CTRE) is the umbrella organization for the following centers and programs:

Bridge Engineering Center
Center for Weather Impacts on Mobility and Safety
Construction Management & Technology
Iowa Local Technical Assistance Program
Iowa Statewide Urban Design and Specifications
Iowa Traffic Safety Data Service
Midwest Transportation Consortium
National Concrete Pavement Technology Center
Partnership for Geotechnical Advancement
Roadway Infrastructure Management & Operations Systems
Traffic Safety and Operations

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Center for Transportation
Research and Education

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UNIVERSITY

Just for street and road workers

The first four articles in this issue are part of a series based on information in Iowa's new *Local Roads Maintenance Workers' Manual*. Additional articles will appear in future issues of *Technology News*.

Chapter topics include the following:

- Interacting with the public
- The roadway (level B and level C roads, gravel roads, asphalt pavements, concrete pavements)
- Shoulders
- Drainage, ditches, and culverts
- Bridges
- Snow and ice control

The manual is specifically for people whose everyday job is to work on Iowa's city streets and county roads. It was developed by CTRE and sponsored by the Iowa Highway Research Board (TR-514).

An advisory committee provided direction and advice:

- Mark Nagra, Delaware County
- Lance LeTellier, Linn County
- Dennis Clift, Cedar Rapids
- Max Cox, Monroe County
- Gary Rank, West Des Moines
- Charlie Terrell, Wapello County
- Chuck Jahren, Iowa State University

The Iowa County Engineers Association, Iowa Chapter of the American Public Works Association, and Iowa Secondary Roads



Cover of new (June 2006) manual for Iowa's maintenance workers

Maintenance Supervisors Association also provided input.

The manual is intended as a general guide to best practices. Of course, every city and county is unique, with its own operating procedures and ways of conducting maintenance activities. Road workers should always follow their supervisor's instructions and their agency's policies and procedures.

To borrow a copy of the manual, contact Jim Hogan, Iowa LTAP librarian, 515-294-9481, hoganj@iastate.edu.

You can download a printable copy, www.ctre.iastate.edu/pubs/maint_worker ■

Acronyms in Technology News

AASHTO	American Association of State Highway and Transportation Officials
APWA	American Public Works Association
CTRE	Center for Transportation Research and Education (at Iowa State University)
FHWA	Federal Highway Administration
Iowa DOT	Iowa Department of Transportation
ISU	Iowa State University
LTAP	Local Technical Assistance Program
MUTCD	Manual on Uniform Traffic Control Devices
NACE	National Association of County Engineers



U.S. Department of Transportation
Federal Highway Administration



Iowa Department
of Transportation

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Just for street and Interacting with the public

(Based on chapter 2 of the *Local Roads Maintenance Workers' Manual*, TR-514)

Interacting with the public may be the most important part of your work day. *You* are the public face of your organization.

Good responses

Be sure to respectfully acknowledge all comments or questions from citizens. If you can address a person's question yourself, do so. If a question is outside your area of responsibility, refer the person to your supervisor.

Following are some effective responses to questions or requests for information:

- That's a good question. I don't know the answer, but let me refer you to someone who does.
- [After responding to a question for which you are responsible.] That's a good question. Have I answered your concern?
- Thanks for your interest.

Sometimes just listening can be useful. But silence can also be misunderstood as inattention, disagreement, or anger.

Gestures, expressions, and vocal inflections also communicate. Be aware of what your body language is saying, especially in situations that may be tense for you.

Key points

- Always be honest, courteous, and respectful.
- Know your agency's position on work rules and maintenance policies and procedures.
- If you don't know an answer, say so. Refer the questioner to your supervisor or other appropriate person.
- When you're asked a question, share only the facts. Don't represent your opinion as your agency's position or policy.

- Do not share your personal opinion. Do not argue. A good question to ask yourself is, "Do I want this conversation on the front page of the newspaper?"
- Be loyal to your agency. If you disagree with a policy or position, take it up with your supervisor, not with someone outside the organization.
- Have information for appropriate contacts readily available.
- Don't take questions or complaints personally. You are a symbol of the organization, much like the referee in a sporting event, and comments are not about you personally.
- Document all questions or comments from the public and report them to your supervisor.

Useful communication tools

In some agencies, maintenance workers carry cards with contact information (name, phone and fax numbers, e-mail, etc.) for various services. See figure 1. When citizens have questions, workers can use the card to refer them to appropriate staff or offices.

Another useful communication tool is a "door knocker": a flyer to hang on house doorknobs. See figure 2. These can be especially useful for answering questions/providing information in advance of specific road maintenance activities. ■

CENTER COUNTY, Iowa 123 Main St., Centertown, IA 50000-0001 515-222-2219; fax 515-222-2200 (www.centercounty.com)	
Joe Brown, Engineer 319-222-2220 joe.brown@centercounty.com	Board of Supervisors 319-222-2224
Mike Black, Roads Supervisor 319-222-2221 mike.black@centercounty.com	Assessor's Office 319-222-2225
Permits and Policies 319-222-2222	Conservation Office 319-222-2226
Planning and Zoning 319-222-2223 M–F 7:00 a.m. to 4:00 p.m.	Utilities 319-222-2227

Figure 1. Sample information card

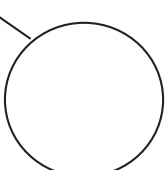
road workers continued

Adjusting the motor grader blade

(Based on chapter 3 of the *Local Roads Maintenance Workers' Manual*, TR-514)

When grading a granular surfaced road, adjust the angle and position of the moldboard depending on the job at hand. For most blading purposes, rotate the moldboard to a horizontal angle of about 30 to 45 degrees. See figure 3. To cut out ridges, washboards, and potholes, put the moldboard in the cut position. See figures 4 and 5. Be sure to put enough pressure on the blade to maintain your cut.

Adjusting continued on page 4



Date: _____

Dear Resident,

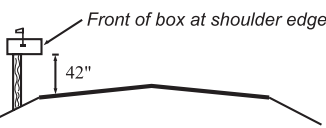
The Linn County Secondary Road Department will begin a grading project on _____. If you have a mailbox or other obstacles within the right of way, please remove them as soon as possible. You should coordinate a temporary location for the mailbox with your post-master.

When work is completed, install the mailbox so that the face of the mailbox is at the edge of the shoulder as shown below. Installation in this manner will allow the carrier to pull out of the lane of traffic to make deliveries. It will also allow the shoulder areas to be plowed more easily in the winter. Mailboxes that are within the roadway are more prone to being hit by vehicles or plowed snow.

The post office has informed us that the height of the mailbox is to be such that it can be reached from a car, approximately 3-1/2 feet above the ground.

We request that mailboxes be installed on a wood post no larger than 4"x4". This type of post is considered a "breakaway" post which may limit or reduce the possibility of serious injury if an accident should occur.

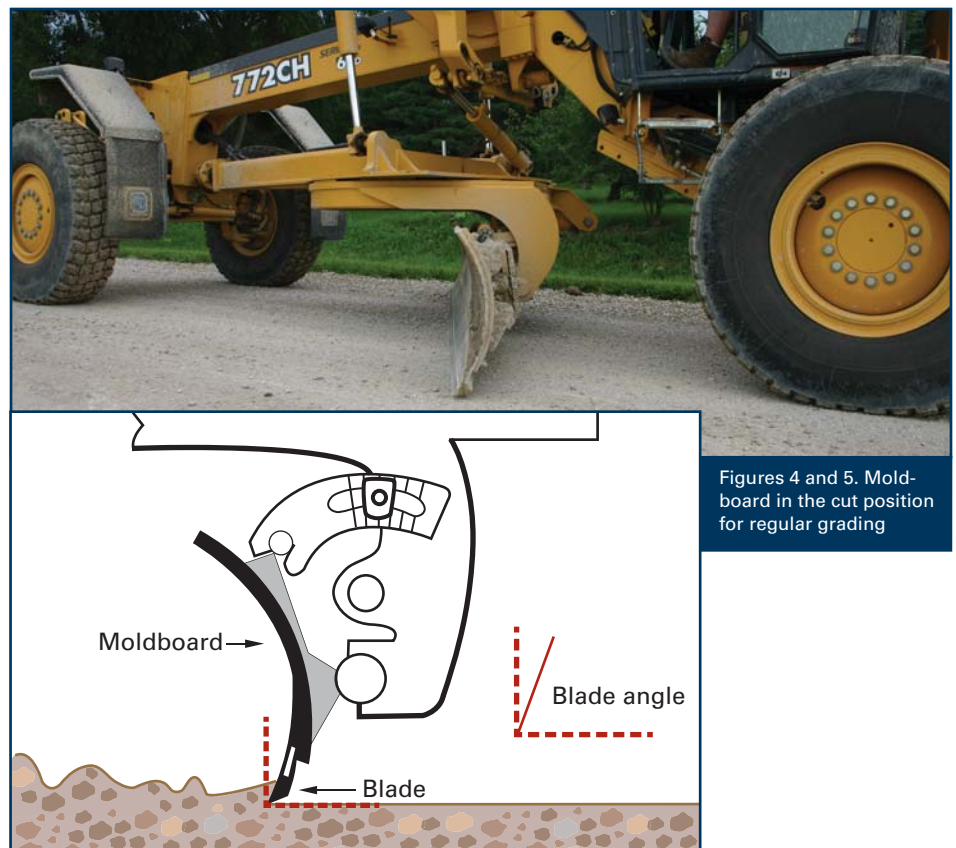
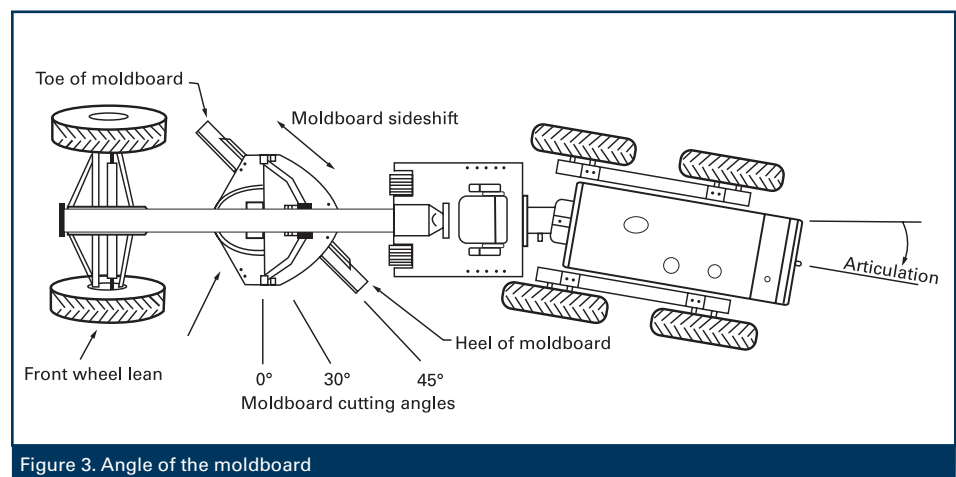
Concrete posts, milk cans and other types of mailbox holders are considered obstructions on the right of way which are prohibited by law.



Linn County Secondary Road Department

1888 County Home Rd
Marion IA 52302
(319) 829-6400

Figure 2. Sample door knocker (provided by Linn County)



Iowa LTAP Mission

To foster a safe, efficient, and environmentally sound transportation system by improving skills and knowledge of local transportation providers through training, technical assistance, and technology transfer, thus improving the quality of life for Iowans.

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Just for street and

Adjusting continued from page 3

You may have to make several passes with the grader to get to the bottom of a corrugated area (washboarding). See figure 6. For heavier grading, tilt the moldboard back. See figure 7.

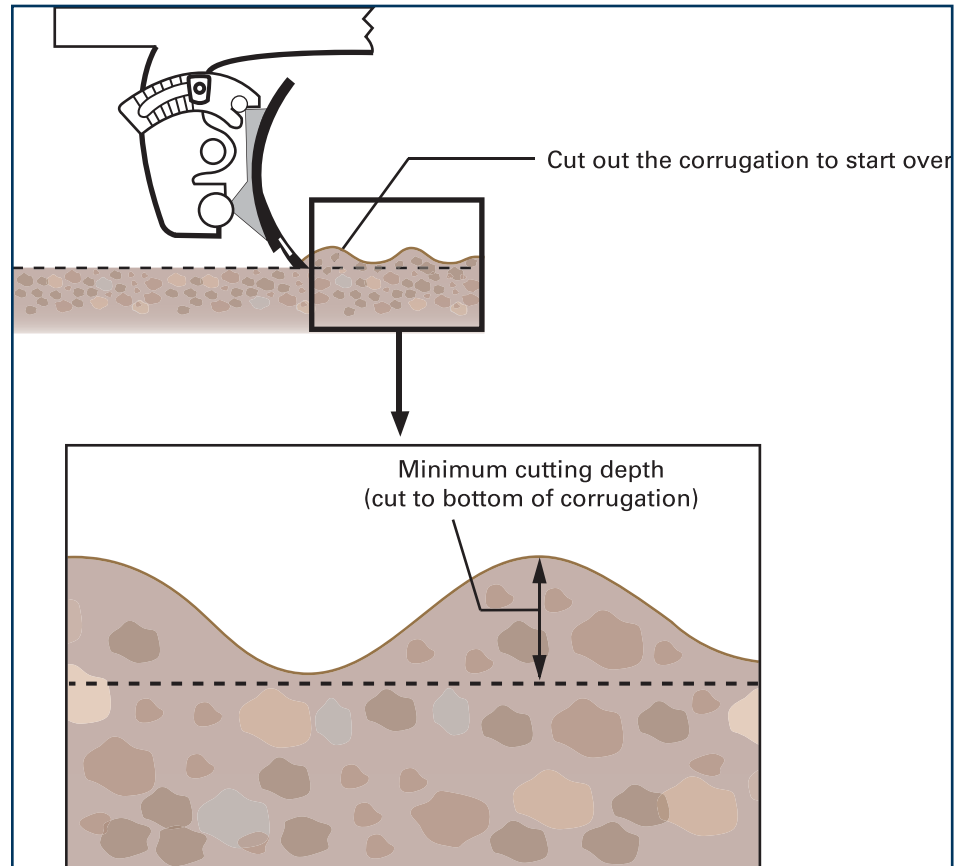


Figure 6. Cutting out a washboard

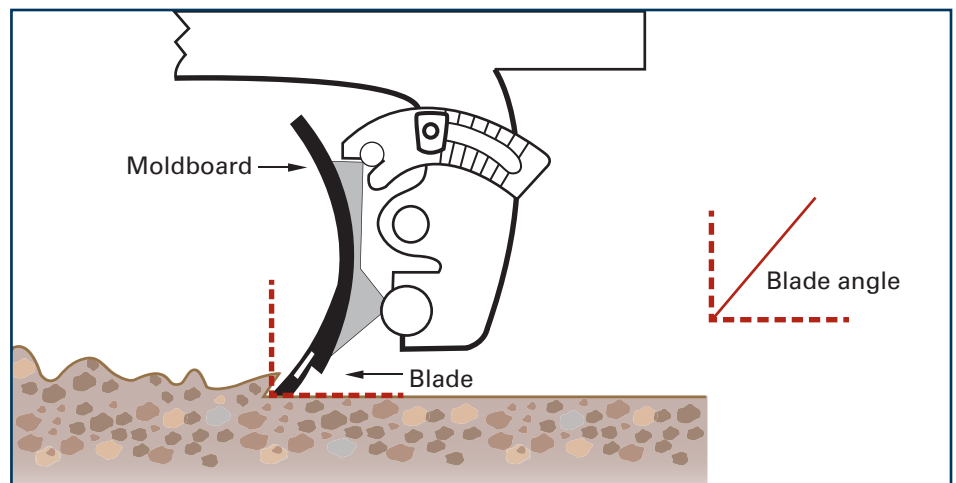


Figure 7. Moldboard tilted backward for heavier grading or more aggressive cutting

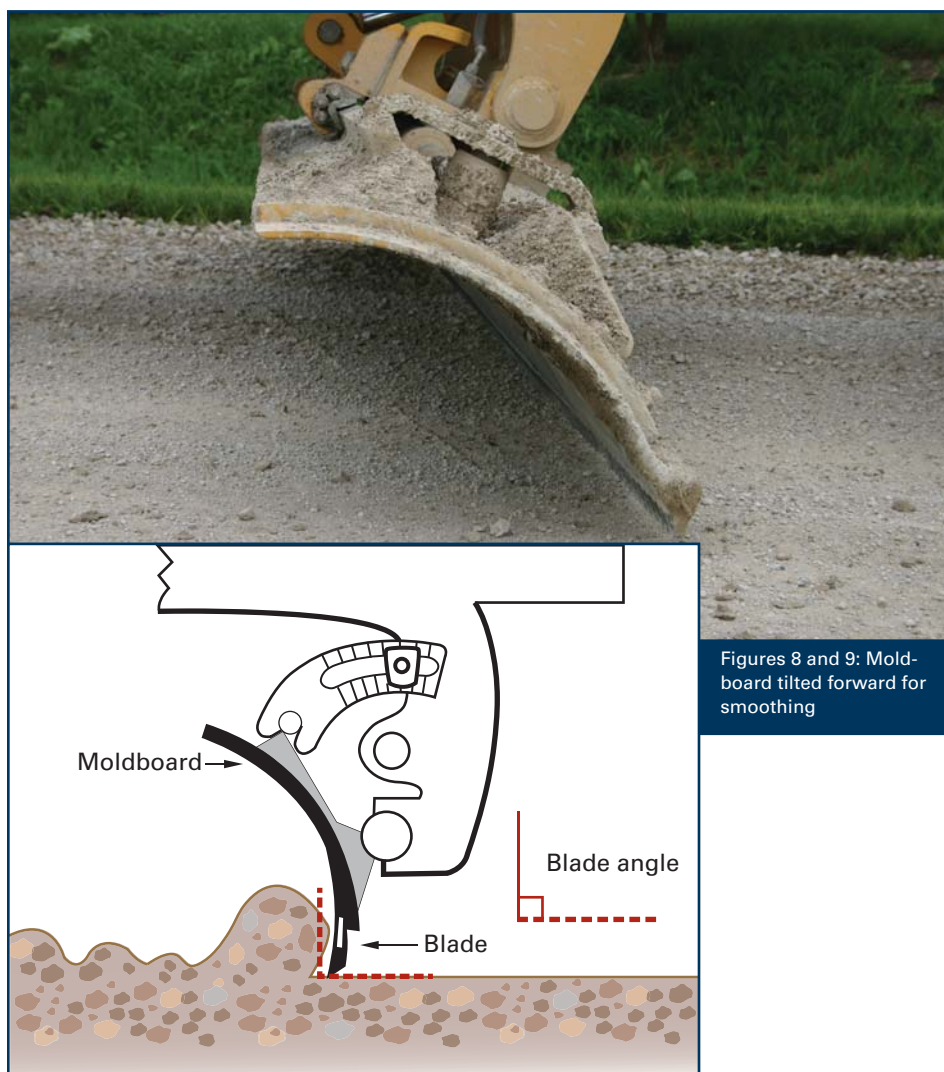
road workers continued

Adjusting continued from page 4

To create a compaction roll that smoothes the road and helps shape the crown, tilt the moldboard forward until the blade is perpendicular to the road. See figures 8 and 9. Move and roll the aggregate in a mixing action away from the shoulder and toward the center of the road.

To bring fine materials back across the road, the blade should be in the “float” position (if that feature exists on your grader). That is, there should be no down pressure except the weight of the blade. To do this, simply turn off the pressure to the blade.

Note: Figures 3, 5, 6, 7, and 9 were adapted from illustrations in *Gravel Roads Maintenance and Design Manual*. FHWA and SD LTAP. 2000. ■



Figures 8 and 9: Moldboard tilted forward for smoothing

Maintaining shoulders on granular surfaced roads

(Based on chapters 3 and 4 of the *Local Roads Maintenance Workers' Manual*, TR-514)

The following deficiencies may be found on shoulders of granular surfaced roads:

- **High shoulders.** Vegetation in the shoulder collects sediment and gradually breaks down, raising the level of the earth. Earth shoulders that were originally flush with the adjacent roadway may, over time, become too high. High shoulders create a safety hazard to drivers and restrict drainage away from the roadway.
- **Erosion.** Shoulder erosion can cause (and may be caused by) poor drainage. Earth or gravel shoulders with steep slopes may be particularly prone to erosion.
- **Secondary ditches.** See figure 10 on the following page. Secondary ditches can form in shoulders from excessive throw-off of material from gravel roads or when there is a lack of proper shoulder maintenance. Secondary ditches can cause many roadway problems that may result in the need to rebuild the roadway.
- **Vegetation.** When vegetation is allowed to grow on earth shoulders, it can inhibit drainage, create secondary ditches, cause snow to drift, and create unsafe conditions for vehicles that leave the roadway.
- **Fixed-object improvements within the clear zone.** Such objects (like fences, utility poles, or culvert headwalls) can be safety hazards.

Shoulders continued on page 6

Just for street and

Providing dust control

Shoulders continued from page 5

To correct shoulder deficiencies, regularly perform the following maintenance activities:

- **Repairing high shoulders.** Shoulders higher than the adjacent pavement should be reshaped and compacted. If vegetation in the shoulder is part of the problem, use a mechanical mixer to break up roots and follow with blading.
- **Repairing erosion and secondary ditches.** Refill, reshape, and compact earth and gravel shoulders in accordance with the original design.
- **Mowing.** Mow earth shoulders regularly. Consult your supervisor, and follow your agency's policies and procedures.
- **Managing obstacles in the clear zone.** Agencies must manage fixed-object improvements located on the shoulder and within the clear zone. The goal is to eliminate collision hazards. If you see fixed objects in the clear zone, notify your supervisor. (See "Final Iowa rule on obstructions in ROW" in the May–June 2006 issue of *Technology News*.)
- **Maintaining shoulders at driveways.** Be aware of the area where a driveway interconnects with the shoulder. Be careful that shoulder maintenance operations do not negatively impact adjacent property owners. Figure 11 shows the proper drainage point for a driveway. ■

(Based on chapter 3 of the *Local Roads Maintenance Workers' Manual*, TR-514)

All granular surfaced roads, whether natural gravel or crushed stone, will produce dust under traffic.

The amount of moisture in the area has a great effect on the amount of dust.

The quality of granular material also has a major impact. Limestone develops the most dust. Glacial gravel, with highly plastic clay, is less prone to developing dust.

Applying dust control products (or dust stabilizers) on higher-volume granular surfaced roads may be cost effective.

Dust continued on page 7



Figure 10. Secondary ditches in shoulders can cause many roadway problems.

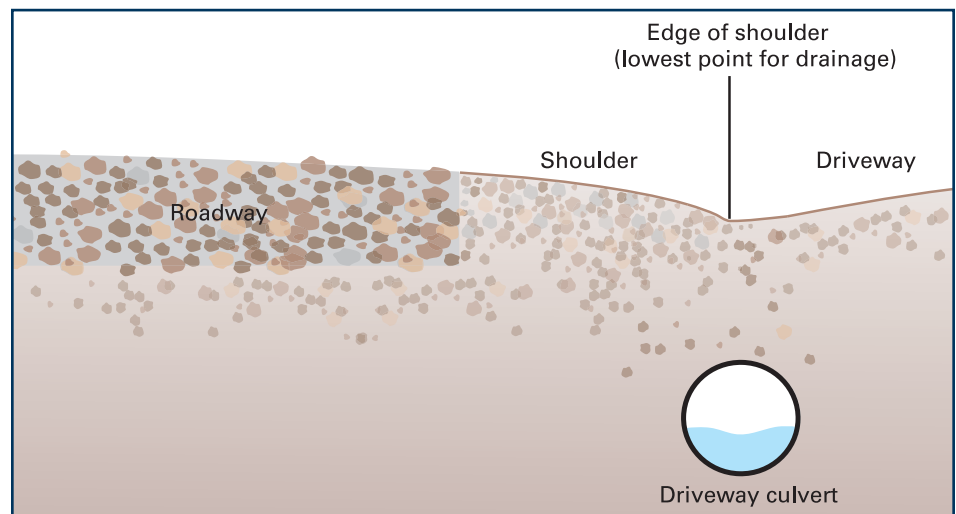


Figure 11. Maintain proper drainage point at driveways.

road workers continued

Dust continued from page 6

In addition to reducing dust, such products can help keep small granular particles on the road and prevent larger stones from being moved to the side of the road, thus reducing the need for blading.

Applying dust control products

- Make sure the road has a uniform crown (between four and six percent) and good drainage.
- Do not compact the road surface before application. In fact, scarify a minimum of one to two inches of the road surface, leaving a uniform depth of loose material across the road.
- Do not apply if rain is forecast. Rain can wash away your product and you may have to reapply.
- If you are using a new product, you may want to start by treating a 500–1,000-foot test section. This will allow you to see how the product works before applying it to the entire roadway.
- Select an application rate and stick to it throughout the entire application process. This will leave you with a consistent roadway.
- Treat one side of the road and then immediately treat the other side to achieve a consistent application.
- After application, immediately open the road to traffic. Traffic will pack the product into the road surface material.
- Some manufacturers of dust control products recommend not blading the surface at all after applying their products. Blading will break the bond that the product has made with the gravel on the roadway.

However, if potholes or other surface defects appear after dust control material has been applied, you may need to blade the road for safety reasons. Check with your supervisor.

Moisture considerations

To be effective, dust control materials should be applied when the road surface material is moist. The optimum moisture level is 13 to 18 percent.

Kinds of dust control materials

Following are the most common types of dust stabilizers used on roadways :

- **Chlorides** are the most common dust control materials. Calcium chlorides come in a flake or a liquid form and are very effective if properly used. Magnesium chloride is available in a liquid form and is very effective if properly used.

Never apply chlorides to dry gravel. Moisture is necessary to help the chlorides penetrate the road surface and coat the granular material. Without moisture, chlorides aren't effective, and you will have to reapply.

After a rain, you can do touch-up maintenance on a gravel road treated with chlorides, and the dust-control properties will be rejuvenated. (The same is not true for roads treated with resins, clays, and vegetable oils.)

- **Resins** (lignin or tree sap) are available under various commercial names. They work best when incorporated into the gravel surface. They provide cohesion to bind particles together.
- **Natural clays** like bentonite will still develop dust in dry weather. They are somewhat difficult to transport and to mix with granular surface material.
- **Soybean** (or other vegetable) **oil** penetrates a gravel surface and provides a light bonding of the gravel that effectively reduces dust. However, vegetable oils tend to harden and may make the roadway more difficult to maintain. ■



General safety tips for street and road workers

- Always check with your supervisor and follow your agency's safety policies and procedures.
- Wear highly visible apparel.
- Be properly trained and familiar with all equipment.
- Make sure an up-to-date first-aid kit, emergency contact information, and hand-held radios or cell phones are available at the work site.
- Perform pre-use check of equipment.
- Make sure motor graders have orange flags attached to the end of the blade and slow-moving vehicle emblems attached to rear of the vehicle.
- If road is open to traffic use proper temporary traffic control, including flaggers if needed, as described in the *Iowa Traffic Control Devices and Pavement Markings: A Manual for Cities and Counties*; in the MUTCD, part 6; and in your agency's policies and procedures.
- For more extensive repair activities, consider short-term road closures with proper signing.
- Do not allow riders in motor graders.
- Avoid backing large equipment and trucks without a spotter.
- Remove all temporary traffic control devices immediately when no longer needed. ■

Build a Better Mousetrap



2005 Better Mousetraps

Editor's note: Each year during the annual Iowa Maintenance Training Expo inventors from across Iowa demonstrate their innovations in the "Better Mousetrap" competition. In this issue of Technology News, we've published some of the 2005 winners.

Plow mounting procedure change for Wausau down-pressure plow

For about \$20 worth of materials and an hour of labor, the Iowa DOT maintenance staff in Onawa have made mounting a plow quick and easy for the truck driver.

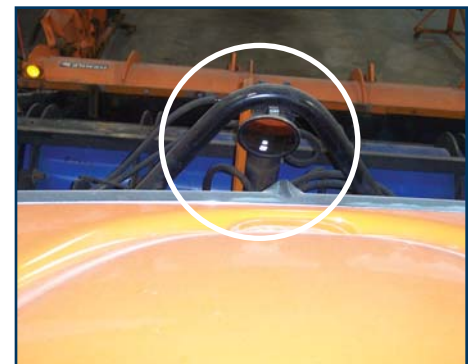
Glenn Hansen and Todd Cogdill made the plow's original equipment manufacturer transport and shipping strap longer. They also added a slotted hole on one end that allows the plow frame to be locked in a raised position when not on the truck. That way the plow is the correct height for the truck to drive up to it and connect.

They attached a nine-inch convex mirror to the plow frame and two small pieces of silver conspicuity tape to the plow ram and the truck mounting plate. The driver watches the mirror and uses the tape to line up the truck with the plow.

For more information, contact Glenn Hansen or Todd Cogdill at 712-423-2040. ■



A mirror and some silver tape make it easier for a driver to load a plow alone.



View from driver's seat

Skid loader attachment rack

Loading equipment is a snap with the skid loader attachment rack built by Iowa DOT maintenance staff in Tipton. The rack keeps skid loader attachments neatly organized, together in one location on the trailer, and tied securely.

Using about \$300 worth of steel tubing and other pieces of metal, the staff welded the rack so that it would support each attachment individually. Now the attachments stay with the skid loader and nothing gets lost.

For more information, contact Trent Sorgenfrey or Denny Petersen at 563-946-2391. ■



The attachment rack is attached to the same trailer that the skid loader rides.

Hydraulic hose organizer for batwing mower

This organizer prevents the hydraulic hoses from getting near the PTO drive line and pivot areas on a batwing mower. It also keeps hoses off the ground.

DOT mechanics in Onawa used 1" by 3" and 2" by 2" steel tubing and pipe to mount the organizer to the base of the mower tongue. The upper arm swings when the tractor turns and the hoses stay in place.

The materials cost about \$15 and the organizer took about an hour to build.

For more information, contact Glenn Hansen or Todd Cogdill at 712-423-2040. ■



Extend the life of hydraulic hoses with the organizer.

Stanley L. Ring Memorial Library: New acquisitions

Note: A few videos are available in both VHS and DVD format. New videos will generally be in DVD format.

Publications

P 1685 Local Roads Maintenance Workers' Manual

This manual describes best roadway maintenance practices for Iowa's local roads and streets. See the cover story in this issue of *Technology News*.

Videos

V743 Fabrication of Epoxy-Coated Rebar

This video outlines recommended practices for fabrication of epoxy-coated rebar: receiving material at the plant, storing, fabricating, shearing, bending, and handling.

V744 Field Handling Techniques for Epoxy-Coated Rebar at the Job Site

This video covers receipt of material, inspection, unloading, job-site handling, and storage. It also covers placement, use of supports and tie wires, lap and mechanical splicing, final inspection, and directions for repairing damaged epoxy coating.

V745 Field Inspection of Reinforcing Bars

This video provides an overview of the placement of reinforcing bars. Topics include criteria and code governing construction, bar size and grade markings, mill test reports, fabrication, placement, concrete covering tolerances, and splicing.

V746 Ice Age: Fighting the War on Meth

V747 Ice Age II: Lessons Learned from Bay County, Florida

Each of these one-hour training documentaries offers a unique perspective on the methamphetamine epidemic. The first focuses on identifying and safely handling the chemicals and equipment that identify a clandestine meth lab. The second uses personal accounts to describe how the illegal manufacturing, use, abuse, and trafficking of methamphetamine wreaked havoc in this quiet county in Florida's panhandle.

Order LTAP library materials in three ways:

- Order online, www.ctre.iastate.edu/library/search.cfm.
- Contact Jim Hogan, library coordinator, 515-294-9481, hoganj@iastate.edu, fax 515-294-0467.
- Mail or fax the order form on the back cover of *Technology News*.

CD-ROMs

CR81 Epoxy Coated Reinforcement

This CD-ROM contains guidebooks, videos, research projects, and other materials covering specifications, field handling techniques, fabrication, and CRSIO's Epoxy Coating Plant Certification Program.

CR82 System Security Awareness for Transportation Employees

This CD-ROM provides employees, supervisors, and managers with practical knowledge that will help them carry out their responsibilities concerning operational and infrastructure security. The suggested practices enhance overall crime prevention efforts.

DVDs

DVD53 Melting the Ice

In this one-hour program, law-enforcement officials discuss the dangerous realities of fighting a "homegrown" drug.

CTRE houses new weather research center

The National Academy of Sciences estimates as many as 7,000 deaths per year are associated with weather-related traffic accidents. Weather-related crashes in Iowa annually add up to more than \$240 million in economic losses.

The new Center for Weather Impacts on Mobility and Safety (C-WIMS) at CTRE provides an opportunity to positively impact Iowans and Iowa's economy by reducing the economic and human losses due to weather-related crashes.

C-WIMS is led by Tom Maze, transportation engineer at CTRE and professor of civil and construction engineering at ISU. Gene Takle, an ISU professor of geological and atmospheric sciences and agronomy, serves on the center's executive committee.

The five-year federal transportation bill signed by President Bush in August 2005 includes \$5 million per year for weather-related research. Iowa State is a natural for that kind of research. Because of its agriculture programs, the university has expertise in the science of weather and its impacts at ground level.

Beyond Iowa and the Midwest, the recent disasters that resulted from hurricanes Katrina and Rita have highlighted the need to better understand weather's impact on transportation.

For information about this new program, see www.ctre.iastate.edu/cwims/



Center for Weather Impacts
on Mobility and Safety

Conference calendar

September 2006

20–22	APWA Fall Conference	Des Moines	Duane Smith 515-294-8103 desmith@iastate.edu
25–27	Iowa Streets and Roads Conference	Ames	Duane Smith 515-294-8103 desmith@iastate.edu

October 2006

3	Intersection Safety Workshop (rural agencies)	Ames	Tom McDonald 515-294-6384 tmcdonal@iastate.edu
5	Intersection Safety Workshop (urban agencies)	Ames	Tom McDonald 515-294-6384 tmcdonal@iastate.edu
10	Intersection Safety Workshop (rural agencies)	Iowa City	Tom McDonald 515-294-6384 tmcdonal@iastate.edu
10	Winter Maintenance Training Workshop	Ames	Duane Smith 515-294-8103 desmith@iastate.edu
12	Intersection Safety Workshop (rural agencies)	Ottumwa	Tom McDonald 515-294-6384 tmcdonal@iastate.edu
12	Winter Maintenance Training Workshop	Storm Lake	Duane Smith 515-294-8103 desmith@iastate.edu
17	Intersection Safety Workshop (urban agencies)	Iowa City	Tom McDonald 515-294-6384 tmcdonal@iastate.edu
18–19	MINK Conference	St. Joseph, MO	Tom McDonald 515-294-6384 tmcdonal@iastate.edu
24	Intersection Safety Workshop (rural agencies)	Mason City	Tom McDonald 515-294-6384 tmcdonal@iastate.edu
24	Winter Maintenance Training Workshop	Burlington	Duane Smith 515-294-8103 desmith@iastate.edu
25	Winter Maintenance Training Workshop	Cedar Rapids	Duane Smith 515-294-8103 desmith@iastate.edu
26	Snow Rodeo (plows, motor graders, loaders)	Cedar Rapids	Duane Smith 515-294-8103 desmith@iastate.edu
31	Intersection Safety Workshop (rural agencies)	Carroll	Tom McDonald 515-294-6384 tmcdonal@iastate.edu

November 2006

2	Traffic and Safety Forum	West Des Moines	Mary Stahlhut 515-239-1169 mary.stahlhut@dot.iowa.gov
7	SUDAS District 4 Meeting	Atlantic	Laurel Raasch 515-294-3360 lmraasch@iastate.edu
9	SUDAS District 3 Meeting	Storm Lake	Laurel Raasch 515-294-3360 lmraasch@iastate.edu
15	SUDAS District 1 Meeting	Ankeny	Laurel Raasch 515-294-3360 lmraasch@iastate.edu
16	SUDAS District 2 Meeting	Charles City	Laurel Raasch 515-294-3360 lmraasch@iastate.edu
28	SUDAS District 6 Meeting	Cedar Rapids	Laurel Raasch 515-294-3360 lmraasch@iastate.edu
30	SUDAS District 5 Meeting	Fairfield	Laurel Raasch 515-294-3360 lmraasch@iastate.edu

Four venues for 2006 Winter Maintenance Training Workshop

In October, city, county, and state winter maintenance staff can update their knowledge and skills at any one of four workshops across the state: Ames, Storm Lake, Burlington, and Cedar Rapids. (See the calendar at left.)

Each workshop will have two areas of emphasis:

- equipment operators
- mechanics/fleet managers

Take advantage of this opportunity to learn from presenters with many years of practical knowledge and experience, while sharing your own ideas and best techniques with your peers. ■

New location and competition for Iowa's 2006 "Snow Rodeo"

Iowa's Snow Rodeo moves to Cedar Rapids on October 26 and features three events:

- snow plow rodeo
- motor grader rodeo
- end loader rodeo (new!)

All three driving courses are new this year.

Competitors can participate in any one event, or in the end loader event and *either* the snow plow *or* motor grader competition. ■

Get more information and/or register online for these events at www.ctre.iastate.edu/calendar/.

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